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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/761,217	01/22/2004	Hiroshi Arakawa	07057.0061	2751

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EXAMINER	
WANG, EUGENIA	

ART UNIT	PAPER NUMBER
1745	

DATE MAILED: 11/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/761,217	ARAKAWA, HIROSHI	
	Examiner	Art Unit	
	Eugenia Wang	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-12 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-12 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 1/22/04 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *See Continuation Sheet*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :1/22/04, 8/17/04, 5/17/05, 1/4/06.

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 10/761217, filed on January 22, 2004.

Information Disclosure Statement

2. The information disclosure statements filed January 22, 2004, August 17, 2004, May 17, 2005, and January 4, 2006 have been placed in the application file and the information referred to therein has been considered as to the merits.

Drawings

3. The drawings received on January 22, 2004 are accepted.

Specification

4. The specification is objected to because of the following informalities: the typographical error "tan" should be changed to 'than' (p 9, line 10).

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 3, and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by US 2002/016554 (Nemoto et al.).

Nemoto et al. teach a lithium secondary battery that has a pressure release valve at the end portion of the battery as a safety mechanism for preventing accidents caused from the rise of a battery's internal pressure due to evaporation of electrolyte solution in the case where the battery temperature rises by over-charging or over-discharging (as applied to claims 1 and 3) (para 0141). Figure 14(a) and 14(b) show the ends of the battery. Groove [85] in figure 14(a) acts as a pressure release valve, since it is torn due to mechanical weakening caused by the rising internal pressure, thus releasing the internal pressure (para 142, lines 6-16). In figure 14(b), metal foil [83], which covers hole [86] bursts to release internal pressure making it a pressure release valve as well (para 0143). It is inherent that these pressure release valves would only open when internal pressure of the battery reached a certain pressure that can be preset (as applied to claims 1 and 3). This pressure check system that starts when battery over-charging commences inherently would release the internal pressure (in the form of evaporated electrolyte solution) before an internal short-circuit occurs (as applied to claim 1). Additionally, the battery structure in Nemoto et al.'s invention can be applied to batteries used as a motor driving power source, such as an electric vehicle or a hybrid electric vehicle (para 0053, lines 15-19) (as applied to claim 6).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nemoto et al.

The teachings of Nemoto et al. have been discussed above and are herein incorporated.

The difference between the teachings of Nemoto et al. and claim 5 is that Nemoto et al. do not teach that the amount of electrolytic solution provided to a lithium ion secondary battery is equal to or larger than the amount shown by the inflection point.

However, the optimum amount electrolytic solution to be used is a result effective variable based on the rate of gas decomposition and the internal space of the battery. Discovery of optimum of result effective variable in known process is ordinarily within the skill of art. (In re Boesch, 205 USPQ 215 (CCPA 1980).) Selection of optimum ranges within the prior art's general condition is obvious. (In re Aller, 105 USPQ 233(CCPA 1955))

Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to alter the result effective variable of the amount of electrolytic solution provided in order to optimize the amount provide with respect to the space available inside the battery and the decomposition rate of the electrolytic solution.

8. Claims 2, 7-9, and 11 rejected under 35 U.S.C. 103(a) as being unpatentable over Nemoto et al. in view of US 6696197 (Inagaki et al.).

The teachings of Nemoto et al. have been discussed above and are herein incorporated.

As to claim 2, Nemoto et al. does not teach that the safety valve is activated ten seconds or more before the inside short-circuit occurs. However Inagaki et al. teaches the fact that the electrolyte (electrolytic solution) can be ignited by a hort-circuit. Therefore the gas decomposed from the electrolytic solution is flammable as well.

The motivation for venting the decomposed gas prior to short-circuiting, as taught by Nemoto et al., is to prevent this situation. Ignition is therefore a result effective variable of the time that decomposed gas is released and the time that short-circuiting occurs.

Applicant shows that as time between decomposed gas release and short-circuiting increases, the likelihood of ignition decreases (figure 3). This relationship is what would be expected, as Ingaki et al. mentions the flammability of the electrolytic solution. Discovery of optimum of result effective variable in known process is ordinarily within the skill of art. (In re Boesch, 205 USPQ 215 (CCPA 1980).) Selection of optimum ranges within the prior art's general condition is obvious. (In re Aller, 105 USPQ 233(CCPA 1955))

Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to activate the safety mechanism for a time longer than 10 seconds before the inside short-circuit occurs in order to prevent ignition of the decomposition gas.

As to claims 7-9 Nemoto et al. teach a lithium secondary battery that has a pressure release valve at the end portion of the battery as a safety mechanism for preventing accidents caused from the rise of a battery's internal pressure due to evaporation of electrolyte solution in the case where the battery temperature rises by over-charging or over-discharging (as applied to claims 7 and 9) (para 0141). Figure 14(a) and 14(b) show the ends of the battery. Groove [85] in figure 14(a) acts as a pressure release valve, since it is torn due to mechanical weakening caused by the rising internal pressure, thus releasing the internal pressure (para 142, lines 6-16). In figure 14(b), metal foil [83], which covers hole [86] bursts to release internal pressure making it a pressure release valve as well (para 0143). It is inherent that these pressure release valves would only open when internal pressure of the battery reached a certain pressure that can be preset (as applied to claims 7 and 9). This pressure check system that starts when battery over-charging commences inherently would release the internal pressure (in the form of evaporated electrolyte solution) before an internal short-circuit occurs (as applied to claim 7).

The difference between the teachings of Nemoto et al. and claims 7-9 is that the safety mechanism used to discharge the decomposition gas has an underlying basis of two times the first time is from overcharging to discharging and the second time is from overcharging to inside short-circuiting (as applied to claims 7 and 9), with the difference between the two times being ten seconds or more (as applied to claim 8).

However Inagaki et al. teaches the fact that the electrolyte (electrolytic solution) can be ignited by a short-circuit. Therefore the gas decomposed from the electrolytic solution is flammable as well.

The motivation for venting the decomposed gas prior to short-circuiting, as taught by Nemoto et al., is to prevent this situation. In order to do this, the two aforementioned times must be found, and the difference between the two times provide the amount of time between the two provide the time that is available for venting, which can be used to ensure the completion of venting before short-circuiting (as applied to claims 7 and 8). Ignition is thus a result effective variable based on the two previously mentioned times (as applied to claims 7 and 8).

The applicant shows that the longer the time period between the difference of the two aforementioned times, the less likely ignition will occur. This relationship is what would be expected, as Ingaki et al. mentions the flammability of the electrolytic solution. Discovery of an optimum of result effective variable in known process is ordinarily within the skill of art. (In re Boesch, 205 USPQ 215 (CCPA 1980).) Selection of optimum ranges within the prior art's general condition is obvious. (In re Aller, 105 USPQ 233(CCPA 1955)) It is also important to reiterate that internal pressure is directly affected by over-charging and increases due to the evaporation of the electrolytic solution (as applied to claim 9) (Nemoto et al., para 0141). Therefore the pressure at which the safety valve is preset to open can be calculated with respect to the difference between the two aforementioned times.

Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to base the activation of the battery's safety mechanism on the two aforementioned times (including their application to internal pressure) in order to prevent ignition of the decomposition gas.

As to claim 11, the difference between the teachings Nemoto et al. and Inagaki et al. do not explicitly teach that the amount of electrolytic solution provided to a lithium ion secondary battery based on the difference between the first and second time. However, the amount of electrolytic solution that can be provided to the battery is inherently dependent on the amount of internal space of the battery, the rate of gas decomposition, and the opening of the safety valve. The safety valve (as taught by Nemoto et al.) is pressure dependent, which not only indicates the amount of gas decomposition but also relates to the difference between the first and second time (see rejection for claim 9). Since the discharge of decomposition gas can be linked to the amount of space in the battery and the pressure inside the battery, a relationship can be drawn between the difference between the first and second time and the amount of electrolytic solution that can be supplied to it.

9. Claims 10 and 12 rejected under 35 U.S.C. 103(a) as being unpatentable over Nemoto et al. and Inagaki et al. in further view of US 6437542 (Liaw et al.).

The teachings of Nemoto et al. and Inagaki et al. as applied to claims 7, 9, and 11 have been discussed above and are herein incorporated.

The difference between claims 10 and 12 and the teachings Nemoto et al. and Inagaki et al. is that charging current is not a basis for the preset pressure of the safety

mechanism (as applied to claim 10) or for the amount of electrolytic solution provided to the lithium ion secondary battery (as applied to claim 12).

Liaw et al. teaches that internal pressure can have multiple dependencies including **time**, operating temperature, ambient pressure, voltage range, **current level**, charge inputs (col 2, lines 19-26). Time has already been established as a variable that affects both preset pressure and electrolytic solution amount (see rejections for claims 9 and 11, respectively). Since none of the aforementioned variables are asserted to be more critical than another, it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to preset the pressure and to provide a certain amount of electrolytic solution (as applied to claims 10 and 12, respectively) using any of the aforementioned variables (current level, in this case) in order to safely vent the battery before short circuiting and in order to provide the necessary amount of electrolytic solution needed by the battery.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eugenia Wang whose telephone number is 571-272-4942. The examiner can normally be reached on 8 - 4:30 Mon. - Fri., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

EW

GREGG CANTELMO
PRIMARY EXAMINER

21 NOVEMBER 2006